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Abstract†

This paper describes a new approach for determining a reserve for claim expenses. While the discussion focuses on workers compensation claims, the methodology is equally applicable to other lines of business. The approach also can be applied to the calculation of the reserve for all claims (including IBNR claims) and the reserve for claims reported to date (excluding IBNR claims). In addition, a methodology for pricing claims-handling services is discussed. The implications of pricing claims-handling services on a handle-to-conclusion basis versus pricing claims-handling services on a limited time handling basis are examined.

Finally, the paper discusses a methodology for tracking the duration so that the rate of claim closing can be monitored. This, in turn, allows targets to be set. Departments that are interested in implementing new techniques for shortening the duration can use the monitoring techniques to determine if their new claim-closing techniques are successful.

Key words and phrases: *closed claims, open claims, duration*

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1 Introduction

The determination of a claim expense reserve is an important issue for workers compensation because of the length of time for which workers compensation claims remain open. The duration has been increasing over the last several years. As duration increases, so does the expense of handling the claim for the remainder of the claim's life.

Self-insurance and large deductible plans are now common means of financing risk. Few self-insureds handle their own claims, however. Risk managers are increasingly aware of the expense of handling claims. As insurance companies and third party administrators (TPAs) are under tremendous pressure to cut expenses, the need to know the total cost of handling claims becomes more important. Companies that are able to estimate their cost of handling claims will be more successful in reducing costs.

There are several ways to estimate claim expense reserves, including the use of automated work measurement and paid-to-paid ratios. Automated work measurement[1] studies show that there are differing levels of work effort necessary for claims in the first 30 days than on claims that have been open for, say, five years. On the other hand, the paid-to-paid methodology assumes that claims incur expense only when initially opened and when closed. While this may not be an unreasonable assumption for claims from short-tailed lines, this assumption is not true for liability claims. Moreover, the paid-to-paid ratio is subject to distortion when a company is growing or shrinking or when a line of business is in transition.[2]

Throughout the rest of the paper, I will describe a methodology for setting a reserve for claim expenses. The method is straightforward and it opens the door to several related issues: specifically, a claim department's monitoring of closing claims and the pricing of claims service. Although this methodology is applicable to any line of business, the discussion and the examples that follow focus on workers compensation lost time claims.

My methodology shares many features with the methodology documented in Wendy Johnson's 1989 paper,[3] e.g., both use claim reporting and claim closure patterns to calculate the reserve. The differences in-

[1] Automated work measurement, also known as time and motion studies, may be used to determine the key drivers in the cost of handling claims.

[2] This was the case for workers compensation throughout the early 1990s as many large customers moved to deductible policies or toward self-insurance.

[3] Johnson, W. "Determination of Outstanding Liabilities for Unallocated Loss Adjustment Expense" *Procedings of the Casualty Actuarial Society* 76 (1989): 111-125.

clude differing assumptions/applications of the expense loads for claim costs. Also, my paper broadens the reserving concepts to pricing and also to the monitoring of claim department efficiency.

2 Some Key Definitions

The following definitions are provided for the convenience of the reader:

Allocated loss adjustment expense (ALAE): Expenses associated with settling a claim that are allocable to a specific claim, e.g., attorneys' fees, investigative fees, independent medical examinations, many managed care expenses, and court and other legal fees;

Created claims: Claims reported to an insurance company or third party administrator. Also known as reported claims;

Duration: The amount of time that a claim remains open. Also known as the life of the claim;

Handle-to-conclusion: A term used by third party administrators to denote claims service that will continue for as long as the claim remains open. The fee charged for handle-to-conclusion, unless otherwise stated, also covers the handling of any reopened claims for as long as they remain (re-)opened;

Intake expense: The cost of setting up a newly created claim in the system;

Limited time handling: A term used by third party administrators to signify claims service for some specified time limit, after which time an additional fee will be charged for the continued handling of the claim;

Outstanding fee: The expense of handling a claim for as long as it remains open. This could be expressed in various ways, e.g., as a fee per month or a quarterly fee;

Reported claims: Claims of which the insurance company or third party administrator has been made aware. Also known as created claims;

Third party administrator (TPA): A company that is in the business of handling and servicing claims. Such a company may also provide services other than claims services such as loss control, risk management information systems, actuarial services, etc. A TPA may

be affiliated with an insurance carrier or operate as a stand-alone entity;

Unallocated loss adjustment expense (ULAE): Expenses associated with settling claims but not allocable to a specific claim, e.g., claim adjusters salaries, heat, light, rent, etc.

3 The New Reserve Methodology

The basic steps of the new reserve methodology are as follows:

Step 1 Construct the closed claim count and created claim[4] count triangles. Ideally, these triangles should have quarterly evaluations; also the created claim counts and the closed claim counts will be net of both canceled claims and claims closed with no loss or ALAE payment. For the sake of brevity, the example presented here is based on annual data; see Table 1.

Either accident year, report year, or policy year triangles may be used, but I prefer the report year version because the accompanying statistics are more useful. Report year triangles result in a ULAE reserve that makes no provision for IBNR claims. Later in the paper I will discuss some of these statistics, e.g., the number of months claims will remain open.

Step 2 Calculate loss development factors (LDF);

Step 3 Use the LDFs to project ultimate claims: Because the example uses report year claims, the ultimate number of claims is identical to the claims reported after twelve months. The number of report year claims could change after the end of the report year, however, due to re-openings, the re-assignment of initially medical only claims to lost time claims (and vice versa), and the removal of canceled or claims closed with no loss or ALAE payment claims. With accident year data, one can use either closed claims, created claims, or a combination of these to project the ultimate number of claims.

Step 4 Calculate the projected open claims: There are at least two methods for calculating the projected open claims. The first is to fill in the bottom of each of the created and closed triangles, i.e., use the LDFs from the first step to estimate the future created

[4]Created claims are reported claims.

claims and use a similar procedure to estimate the future closed claims. Taking the difference of the projected created and the projected closed claims provides the projected open claims. In my experience, this can lead to some unreasonable results, e.g., more than 10 percent of claims remaining open after ten years for a line where this is not reasonable, which makes additional re-selection of the LDFs necessary.

My preferred method for projecting the open claims is to calculate another triangle which is the ratio of the (actual) open claims to the ultimate claims. By selecting the percentage of open claims at each evaluation and then applying this percentage to the ultimate number of claims for each year, one derives the projected number of open claims. This is illustrated in Tables 2 and 3.

Step 5 Estimate the average number of in-force claims during a year. One way of estimating the number of in-force claims during a year is to average the number of open claims at the beginning and end of a year as shown in Table 4.

Step 6 Calculate the reserve for each year by multiplying the number of open claims by the outstanding cost per claim: Multiplying the number of in-force claims in each year (Table 4) by the outstanding cost per claim per year (Table 5) gives the cost of handling claims in that particular year. This calculation produces the incremental cost per year as shown in Table 6. Summing all of these costs after a particular point in time, e.g., as of 12 months, results in the reserve for claim expenses as of 12 months (only for claims open through ten years); see Table 7.

4 An Example

This example assumes that the outstanding claim expense per year is \$600 in 1995 dollars.[5] Future expenses are assumed to increase at 4 percent per year. The nominal value of the reserve can be calculated by using \$600 consistently for as long as claims are expected to remain open.

One way of determining the outstanding cost per claim is an automated work measurement study within the claim department. Such a study would determine standards to complete various tasks rather

[5]This is not a true standard that will apply to any company nor should it be construed to be my company's standard.

than dollar amounts because many costs are inflation-sensitive. For example, one may determine that a typical workers compensation claim requires fifteen hours to settle (which could be translated into a cost using the most current hourly rates) rather than saying its ultimate handling cost is $600.

The reserve calculated in Table 7 covers only the expense in the first ten years the claims are open because the triangles used in the example end at ten years. Because there are claims remaining open after ten years and there will likely be claims open for as many as 40 years (or more), the reserve must be adjusted to account for the claims open after ten years.

The assumption to be used in calculating this tail reserve is that any workers compensation claim still open after ten years is a tabular claim for which benefits will be paid for the claimant's or the survivor's lifetime. Ten years is used in this example only; it is not meant to be a standard. For example, if one has data through 15 or 20 years, one could make the same assumption at 15 or 20 years.

One can obtain historical information about the age of the claimant or survivor ten years after the claim is reported (for report year statistics) or ten years after the claim occurs (for accident year statistics). Additionally, an assumption must be made about the average age at death to determine how many years the claims will remain open. Refinements to this methodology are possible, e.g., one can apply mortality tables to each claim open after ten years.

We will assume that claims open for ten years will remain open, on average, for an additional 25 years. The tail reserve is the product of the number of claims open after ten years multiplied by 25 times the annual cost of handling the claim. The tail reserve calculated in this manner is sensitive to the number of years used in the calculation. The significant dollar amounts produced by this methodology beg the question "Will it really cost this much to handle tabular claims?"

While tabular claims incur expense, these claims are generally less expensive to handle than newer claims. The work typically involved in maintaining an open tabular claim is an annual or semi-annual review of the reserve and the mail delivery of a monthly or weekly check (typically an automated process). Discussions with my claim department indicate that tabular claims incur roughly one-third of the expense of a newer claim. This may differ from company to company; this also will differ for cases involving ongoing intensive medical treatment.

Table 1

Created Claims

Year	12	24	36	48	60	72	84	96	108	120	Ultimate	Tail Reserve
1986	101,909	101,909	101,909	101,909	101,909	101,909	101,909	101,909	101,909	101,909	101,909	17,653,849
1987	96,869	96,869	96,869	96,869	96,869	96,869	96,869	96,869	96,869		96,869	17,450,111
1988	102,346	102,346	102,346	102,346	102,346	102,346	102,346	102,346			102,346	19,150,355
1989	107,315	107,315	107,315	107,315	107,315	107,315	107,315				107,315	20,820,107
1990	111,029	111,029	111,029	111,029	111,029	111,029					111,029	22,425,567
1991	107,345	107,345	107,345	107,345	107,345						107,345	22,565,617
1992	113,367	113,367	113,367	113,367							113,367	24,743,281
1993	107,084	107,084	107,084								107,084	24,368,548
1994	107,687	107,687									107,687	25,500,196
1995	104,446										104,446	25,695,792

Table 2

Ratio of Open to Ultimate Claims

Year	12	24	36	48	60	72	84	96	108	120
1986	0.4581	0.2382	0.1364	0.0903	0.0585	0.0440	0.0346	0.0267	0.0242	0.0200
1987	0.4677	0.1991	0.1130	0.0655	0.0455	0.0355	0.0273	0.0229	0.0180	
1988	0.4567	0.2122	0.1184	0.0608	0.0576	0.0434	0.0318	0.0233		
1989	0.4647	0.2083	0.1284	0.0823	0.0589	0.0424	0.0323			
1990	0.4607	0.2284	0.1412	0.0971	0.0703	0.0509				
1991	0.4631	0.2294	0.1452	0.0990	0.0675					
1992	0.4669	0 2500	0.1594	0.0990						
1993	0.4616	0.2181	0.1359							
1994	0.4643	0.2476								
Average	0.4626	0.2257	0.1347	0.0877	0.0597	0.0432	0.0315	0.0243	0.0211	0.0200
Selected	0.4626	0.2257	0.1347	0.0877	0.0597	0.0432	0.0315	0.0243	0.0211	0.0200

Table 3

Actual and Estimated Open Claims

Year	12	24	36	48	60	72	84	96	108	120
1986	46,680	24,271	13,903	9,203	5,960	4,479	3,525	2,726	2,468	2,038
1987	45,306	19,287	10,949	6,341	4,410	3,438	2,646	2,219	1,742	1,937
1988	46,745	21,720	12,115	8,265	5,900	4,445	3,255	2,385	2,160	2,047
1989	49,865	22,355	13,775	8,835	6,320	4,550	3,470	2,608	2,264	2,146
1990	51,152	25,355	15,678	10,780	7,810	5,647	3,497	2,698	2,343	2,221
1991	49,710	24,630	15,585	10,630	7,245	4,637	3,381	2,608	2,265	2,147
1992	52,935	28,340	18,070	11,225	6,768	4,897	3,571	2,755	2,392	2,267
1993	49,428	23,352	14,554	9,391	6,393	4,626	3,373	2,602	2,259	2,142
1994	50,002	26,668	14,505	9,444	6,429	4,652	3,392	2,617	2,272	2,154
1995	49,155	23,573	14,069	9,160	6,235	4,512	3,290	2,538	2,204	2,089

Notes: (1) Numbers above the jagged line are actual data, while numbers below are estimates, and; (2) For example, for year 1995 at 24 months: $23,573 = 0.2257 \times 104,446$, where 0.2257 is the selected open ratio and 104,446 is the estimate of ultimate claims for 1995.

Table 4

Average Open Claims

Year	12	24	36	48	60	72	84	96	108	120
1986	23,340	35,476	19,087	11,553	7,582	5,220	4,002	3,126	2,597	2,253
1987	22,653	32,297	15,118	8,645	5,376	3,924	3,042	2,433	1,981	1,840
1988	23,373	34,233	16,918	10,190	7,083	5,173	3,850	2,820	2,273	2,104
1989	24,933	36,110	18,065	11,305	7,578	5,435	4,010	3,039	2,436	2,205
1990	25,576	38,254	20,517	13,229	9,295	6,729	4,572	3,098	2,521	2,282
1991	24,855	37,170	20,108	13,108	8,938	5,941	4,009	2,995	2,437	2,206
1992	26,468	40,638	23,205	14,648	8,997	5,833	4,234	3,163	2,574	2,330
1993	24,714	36,390	18,953	11,973	7,892	5,510	4,000	2,988	2,431	2,201
1994	25,001	38,335	20,587	11,975	7,937	5,541	4,022	3,005	2,445	2,213
1995	24,578	36,364	18,821	11,615	7,698	5,374	3,901	2,914	2,371	2,147

Notes: Average Open Claims = Average number of claims at the beginning and the end of the year.

Table 5

Cost Per Open Claim

Year	12	24	36	48	60	72	84	96	108	120
1986	422	438	456	474	493	513	533	555	577	600
1987	438	456	474	493	513	533	555	577	600	624
1988	456	474	493	513	533	555	577	600	624	649
1989	474	493	513	533	555	577	600	624	649	675
1990	493	513	533	555	577	600	624	649	675	702
1991	513	533	555	577	600	624	649	675	702	730
1992	533	555	577	600	624	649	675	702	730	759
1993	555	577	600	624	649	675	702	730	759	790
1994	577	600	624	649	675	702	730	759	790	821
1995	600	624	649	675	702	730	759	790	821	854

Notes: Cost per open claim is assumed to be $600 per year in 1995 dollars. Prior and subsequent expenses are derived assuming 4 percent inflation.

Table 6

Incremental Cost Per Year

Year	12	24	36	48	60	72	84	96	108	120
1986	9,839,025	15,552,960	8,702,731	5,478,302	3,738,864	2,676,990	2,134,658	1,733,820	1,498,269	1,351,800
1987	9,931,395	14,725,611	7,168,785	4,263,336	2,757,000	2,093,053	1,687,500	1,403,365	1,188,300	1,147,848
1988	10,656,707	16,232,665	8,342,971	5,226,273	3,777,790	2,869,360	2,221,154	1,692,000	1,418,040	1,365,087
1989	11,822,710	17,807,873	9,265,223	6,030,062	4,203,495	3,135,577	2,406,000	1,896,336	1,580,867	1,488,195
1990	12,612,965	19,619,551	10,943,456	7,338,572	5,362,500	4,037,100	2,852,928	2,010,154	1,701,132	1,601,770
1991	12,747,695	19,826,397	11,154,308	7,562,019	5,362,500	3,707,184	2,601,681	2,021,043	1,710,216	1,610,362
1992	14,117,707	22,542,992	13,387,500	8,788,500	5,613,816	3,785,059	2,857,605	2,220,158	1,878,634	1,768,536
1993	13,709,689	20,994,231	11,371,800	7,470,840	5,121,592	3,718,463	2,807,310	2,180,850	1,845,215	1,737,425
1994	14,423,654	23,001,000	12,845,976	7,770,972	5,356,490	3,888,961	2,936,027	2,280,991	1,930,077	1,817,186
1995	14,746,800	22,691,136	12,214,076	7,838,840	5,402,992	3,922,611	2,961,606	2,300,775	1,946,926	1,833,083

Notes: For example, for year 1995, expenses as of 12 months is equal to $14,746,800 = 24,578 \times 600$, where 24,578 is the number of average open claims for 1995 as of 12 months and 600 is the estimated cost per open claim (as shown on Table 5).

Table 7
Tail Reserve by Report Year
Workers Compensation Lost Time Claims

Report Year	(1)	(2)	(3)	(4)
1986	200	43.3117	2,038	$17,653,849
1987	208	43.3117	1,937	$17,450,111
1988	216	43.3117	2,047	$19,150,355
1989	224	43.3117	2,146	$20,820,107
1990	232	43.3117	2,221	$22,445,567
1991	244	43.3117	2,147	$22,565,627
1992	252	43.3117	2,267	$24,743,281
1993	264	43.3117	2,142	$24,368,548
1994	272	43.3117	2,154	$25,500,196
1995	284	43.3117	2,089	$25,695,792

Col. (1) = Estimated annual claim expense after 10 years and is one-third of the expense of handling newer claims. Col. (2) = Inflationary factor for 25 years, and is $\sum_1^{25} 1.04^k$. Col. (3) = Projected number of claims open after ten years and is taken from Table 2. Col. (4) = Cols. (1) × (2) × (3).

The tail reserve is estimated as the number of claims open after ten years multiplied by the outstanding expense per year multiplied by the number of years the claim is expected to remain open. In this example, we assume claims open after ten years will remain open, on average, for an additional 25 years. Note that the resulting tail reserve is sensitive to the number of years used. For example, for report year 1986:

$$\begin{aligned} \text{Tail Reserve} &= 2,038 \times \$600 \times 43.3117 \\ &= \$52,961,547. \end{aligned}$$

As discussed in the paper, the tail or tabular claims incur roughly one-third the expense of a newer claim. Then the tail reserve for report year 1986 would be $17,653,849. Similarly, the tail reserve for other report years may be calculated.

The tail reserve for each report year is calculated as shown above. In Table 8 this tail reserve is shown for each report year after 120 months. The total reserve is calculated by summing the cost per quarter after a particular quarter. The reserve for older report years (or accident years) may be calculated using the procedure described above. See Tables 8, 9, and 10.

5 Duration

We have presented a methodology for calculating the total reserve, which is the sum of the expenses in handling claims in the first ten years and the tail reserve for the tabular claims. The example is based on report year data. If this methodology is used with accident or policy year data, the reserve will be for all claims, whether reported or not. For a company that does not wish to hold reserves for incurred but not reported (IBNR) claims or for claims that are not yet incurred, a variation of this methodology is necessary.

The concept of duration is introduced to illustrate the calculation of a reserve per claim. Duration is the average life of a claim or the length of time, on average, that a claim remains open. Duration has a different and distinct meaning in the financial community from that offered here. Because a claim incurs expense for as long as it remains open, duration is a key factor in calculating both the reserve and the cost of handling of a claim.

One way of computing the duration of a claim involves counting the number of days between the date of report and the date of closure using many years. This method of computing the duration may understate a company's duration if the claims system began in (for example) 1970 or if the company has not been writing workers compensation claims since the early 1900s. (It is not uncommon for workers compensation claims to remain open for 50 years or more). Even for a company writing business for many years, the duration may be misstated if the volume has changed significantly over time or if the nature of claims has changed.

Another way of estimating duration is to use triangles of claim count data. For each report year, one takes the weighted average over time of the incremental closed claims in each quarter as well as the weighted average over time of the incremental reported claims in each quarter. The difference of the closed weighted average and the created weighted average gives an estimate of the duration for each report year.

A company with only 20 years of workers compensation experience could compute the truncated duration of the first 20 years worth of claims and then make the assumption that claims still open after 20 years are tabular claims. One could estimate the length of time the tabular claims will remain open using annuity tables or use a method similar to that illustrated above for the tail reserve. The total duration could then be calculated using a simple weighted average.

Table 8

Year	Reserve as of Year									
	12	24	36	48	60	72	84	96	108	120
1986	42,868,395	27,315,435	18,612,704	13,134,402	9,395,538	6,718,548	4,583,889	2,850,069	1,351,800	0
1987	36,434,799	21,709,187	14,540,402	10,277,066	7,520,066	5,427,013	3,739,513	2,336,148	1,147,848	0
1988	43,145,341	26,912,675	18,569,704	13,343,431	9,565,641	6,696,281	4,475,127	2,783,127	1,365,087	0
1989	47,813,627	30,005,754	20,740,532	14,710,469	10,506,975	7,371,398	4,965,398	3,069,062	1,488,195	0
1990	55,467,164	35,847,613	24,904,156	17,565,584	12,203,084	8,165,984	5,313,056	3,302,902	1,601,770	0
1991	55,555,710	35,729,313	24,575,005	17,012,986	11,650,486	7,943,302	5,341,621	3,320,578	1,610,362	0
1992	62,842,799	40,299,807	26,912,307	18,123,807	12,509,991	8,724,932	5,867,328	3,647,170	1,768,536	0
1993	57,247,725	36,253,495	24,881,695	17,410,855	12,289,262	8,570,799	5,763,490	3,582,639	1,737,425	0
1994	61,827,679	38,826,679	25,980,703	18,209,731	12,853,241	8,964,281	6,028,254	3,747,263	1,817,186	0
1995	61,112,045	38,420,909	26,206,833	18,367,993	12,965,001	9,042,390	6,080,785	3,780,010	1,833,083	0

Notes: This reserve calculated in this example only covers claim expenses through the first ten years. For example, for year 1995, the reserve as of 36 months is $26,206,833 = 7,838,840 + 5,402,992 + 3,922,611 + \ldots$, which is the sum of the incremental cost per year for each year after 36 months.

Table 9

Incremental Cost Per Year

Year	12	24	36	48	60	72	84	96	108	120	Reserve
1986	9,839,025	15,552,960	8,702,731	5,478,302	3,738,864	2,676,990	2,134,658	1,733,820	1,498,269	1,351,800	17,653,849
1987	9,931,395	14,725,611	7,168,785	4,263,336	2,757,000	2,093,053	1,687,500	1,403,365	1,188,300	1,147,848	17,450,111
1988	10,656,707	16,232,665	8,342,971	5,226,273	3,777,790	2,869,360	2,221,154	1,692,000	1,418,040	1,365,087	19,150,355
1989	11,822,710	17,807,873	9,265,223	6,030,062	4,203,495	3,135,577	2,406,000	1,896,336	1,580,867	1,488,195	20,820,107
1990	12,612,965	19,619,551	10,943,456	7,338,572	5,362,500	4,037,100	2,852,928	2,010,154	1,701,132	1,601,770	22,445,567
1991	12,747,695	19,826,397	11,154,308	7,562,019	5,362,500	3,707,184	2,601,681	2,021,043	1,710,216	1,610,362	22,565,627
1992	14,117,707	22,542,992	13,387,500	8,788,500	5,613,816	3,785,059	2,857,605	2,220,158	1,878,634	1,768,536	24,743,281
1993	13,709,689	20,994,231	11,371,800	7,470,840	5,121,592	3,718,463	2,807,310	2,180,850	1,845,215	1,737,425	24,368,548
1994	14,423,654	23,001,000	12,845,976	7,770,972	5,356,490	3,888,961	2,936,027	2,280,991	1,930,077	1,817,186	25,500,196
1995	14,746,800	22,691,136	12,214,076	7,838,840	5,402,992	3,922,611	2,961,606	2,300,775	1,946,926	1,833,083	25,695,792

Notes: For example, for year 1995, expenses as of 12 months is $14,746,800 = 24,578 \times 600$, where 24,578 is the number of average open claims for 1995 as of 12 months and 600 is the estimated cost per open claim (as shown on Table 5).

Table 10

Reserve as of Year

Year	12	24	36	48	60	72	84	96	108	120
1986	60,522,244	44,969,284	36,266,553	30,788,251	27,049,387	24,372,397	22,237,738	20,503,918	19,005,649	17,653,849
1987	53,884,910	39,159,298	31,990,513	27,727,177	24,970,177	22,877,124	21,189,624	19,786,259	18,597,959	17,450,111
1988	62,295,696	46,063,030	37,720,059	32,493,786	28,715,996	25,846,636	23,625,482	21,933,482	20,515,442	19,150,355
1989	68,633,734	50,825,861	41,560,639	35,530,576	31,327,082	28,191,505	25,785,505	23,889,169	22,308,302	20,820,107
1990	77,912,731	58,293,180	47,349,723	40,011,151	34,648,651	30,611,551	27,758,623	25,748,469	24,047,337	22,445,567
1991	78,121,337	58,294,940	47,140,632	39,578,613	34,216,113	30,508,929	27,907,248	25,886,205	24,175,989	22,565,627
1992	87,586,080	65,043,088	51,655,588	42,867,088	37,253,272	33,468,213	30,610,609	28,390,451	26,511,817	24,743,281
1993	81,616,273	60,622,043	49,250,243	41,779,403	36,657,810	?2,939,347	30,132,038	27,951,187	26,105,973	24,368,548
1994	87,327,875	64,326,875	51,480,899	43,709,927	38,353,437	34,464,477	31,528,450	29,247,459	27,317,382	25,500,196
1995	86,807,837	64,116,701	51,902,625	44,063,785	38,660,793	34,738,182	31,776,577	29,475,802	27,528,875	25,695,792

Notes: For example, for year 1995, the reserve as of 36 months is $51,902,625 = 7,838,840 + 5,402,992 + 3,922,611 + \ldots$, which is the sum of the incremental cost per year for each year after 36 months.

As an example, assume the duration of the report year 1977 closed claims as of December 31, 1996 is 12.6 months and that 99.5 percent of report year 1977 claims are closed. The remaining 0.5 percent of claims are open and are expected to remain open for an additional 21 years. The total duration would be 15 months.[6]

Duration differs by state because of the different laws in each state for workers compensation benefits. For example, the duration of the permanent total claims in the ten states in the 1994 National Council on Compensation Insurance (NCCI) Closed Claims Studies[7] ranged from 21.3 months (South Carolina) to 50.2 months (Wisconsin). Industry data from these 1994 NCCI studies show increasing durations for all of the ten states in the study. This study measures the duration in median number of days for permanent disability claims through closure year 1992. It seems likely that managed care will have some impact on decreasing the overall claim duration, but it is too soon to determine the validity of this hypothesis.

We assume that the countrywide duration for a workers compensation lost time (WCLT) claim is 15 months, the cost per month of handling a claim is $50, and there is no inflation. Every reported claim needs a reserve of $750 (= 15 × $50) set aside. Therefore, the reserve at any point in time would be: Number of Created Claims × $750 − Reserve Released for Open Claims. This concept is probably easier to illustrate than to explain.

Assume that one claim is reported at the beginning of each quarter and that the number of open claims at the end of each quarter is as shown below. Also assume for simplicity that claims close at the end of the quarter.

In the example above, the reserve is increased $750 whenever a claim is reported and the reserve is drawn down $50 every month a claim is open. So each quarter the reserve is computed as the reserve at the beginning of the quarter plus the addition to the reserve (from newly-reported claims) minus the claim expenses incurred during the quarter.

In the example above, the assumption is made that claim expense is incurred if the claim is open at the end of the month. Because one claim was closed before the end of the first month of the quarter in the fourth quarter, no money is released from the reserve for this claim. In this way, the money set aside for claims that close early (before 15 months) is there for the claims that remain open late (after 15 months).

[6]Duration = $0.995 \times 12.6 + 0.005 \times (21 + 19.5) \times 12 = 15$ months.

[7]Hartwig, R.P., Kahley, W.J. and Retrepo, T.E. "Workers Compensation Loss Ratios and the Business Cycle." *NCCI Digest* 9, no. 2 (December 1994): 1-13.

Table 11
Quarterly Reserve Calculations

	(1)	(2)	(3)	(4)	(5)
Q1	1	1	$750	$150	$600
Q2	1	2	$750	$300	$1,050
Q3	1	3	$750	$450	$1,350
Q4	1	3	$750	$450	$1,650

Q1 = First Quarter, etc.; Col. (1) = Number of Reported Claims; Col. (2) = Number of Open Claims (at the end of each month of the quarter; Col. (3) = Addition to the Claim Reserve; Col. (4) = Subtraction from Claim Reserve; and Col. (5) = Reserve at the End of the Quarter.

6 Pricing Claims Service

The concept of duration is used to compute the reserve per claim, which can easily be modified to derive the price of handling a claim. For many customers today and for virtually all national accounts customers, claims service is an unbundled, separately negotiated piece of the risk-financing program.

The methodology described here is only for the basic claim expenses. The total cost of adjusting claims is the sum of basic unallocated and the sundry allocated types of loss adjustment expenses such as legal expenses, managed care expenses, nurse case managers, etc.

In the examples presented thus far, we have assumed that claims incur uniform expenses each month for the first ten years. Discussions with my claim department indicate that this is an overly simplistic assumption. Rather, a claim generally incurs the most expense during the first month in which it is open, during which time the file must be set up, various phone calls must be made, investigative work is necessary, etc. Therefore, the expense incurred by a claim may better be modeled by assuming an intake expense and then several months of outstanding expense for as long as the claim is open. One could also incorporate a closing expense for the cost necessary in closing a claim.

A further refinement in modeling the claim expense would be to differentiate outstanding expenses. Again, the idea is that the first few months a claim is open are more labor-intensive than are later months. Thus, there may be discriminatory standards for outstanding expenses.

The cost of handling a claim (excluding ALAE) would be:

$$\text{Cost} = \text{Intake Expense} + (OS_1 \times x) + (OS_2 \times (\text{Duration} - 1 - x)),$$

where x is the number of months early in the claim's life when the claim is more expensive, OS_1 is the higher cost of handling claims in the first few months and OS_2 is the lower cost of handling claims later. Note that we are assuming the cost of handling a claim in the first month is included in the intake expense, so we only must account for (Duration – 1) months of outstanding expenses.

In setting the reserve using the reserve per claim concept, a reserve equal to

$$\text{Reserve Per Claim} = (OS_1 \times x) + (OS_2 \times (\text{Duration} - 1 - x))$$

would be set aside for each claim in the month in which the claim is reported. If the claim closes in the first month, then the full reserve would be banked for claims remaining open longer than the average life of the claim. If the claim remains open at the end of the second (or third) month, then OS_1 dollars would be released from the reserve. If the claim remains open at the end of the fourth and succeeding months, then OS_2 dollars would be released from the reserve for each month the claim is open.

These additional claim standards will have to be determined based on some type of work measurement study. Although these standards conceivably will differ by state due to differences in wage levels, rent, etc., the most significant difference by state is due to duration. One could take these differing durations into account in pricing claims service to avoid adverse selection in problem states.

The formula presented above is for handle-to-conclusion pricing, i.e., the fee is sufficient to cover the expenses of handling the claim for as long as the claim is open. Today many third party administrators (TPAs) also price claims on a limited time handling basis. Under this option, an additional fee would be levied to service claims remaining open after (for example) two years. This additional fee typically is negotiated at the time of sale.

Today most large (self-)insureds separately negotiate the cost of claims service with an insurance company TPA or a stand-alone TPA. The stand-alone TPA will partner with an insurance company who is willing to unbundle its claims service. While an insurance company TPA would be willing to offer this limited time handling option, many insurance companies would not want the insured to take its claims elsewhere to be serviced because these claims are the insurance company's liability (or conceivably could be if serviced under a deductible policy).

Given a handle-to-conclusion fee, how could one quickly estimate the limited time handling fee? The statistics in Table 2 show that 22.6 percent of claims remain open after two years. We could then estimate the limited time handling fee for two years as $(1 - 0.226) \times \text{HTC}$, where HTC is the handle-to-conclusion fee. The claims remaining open after two years would begin to incur a monthly fee and would continue to do so as long as the claim stayed open. The flaw of this quick estimate is the 77.4 percent of claims closed in the first two years have lower average claim handling cost than do the 22.6 percent of claims still open after two years.

Claims still open at 24 months likely will remain open an additional 24 months. This is a key statistic because it allows you to price the claim handling expense for these claims. Many persons find it surprising when told the cost to handle a claim that has been open for 24 months is higher than the cost to handle a new claim. A new claim will be open, on average, for a shorter duration than an old claim, i.e., a claim remaining open after 24 months. If a customer chooses to pay a one-time fee to handle a claim remaining open after 24 months, the necessary fee assuming a monthly outstanding expense of \$50 will be $\$1,200 = 24 \times \$50$ (per claim).

This one-time fee also could be calculated as the cost of handling takeover claims. A customer who has limited time handling option who chooses to take its claims to another TPA would be subject to a takeover claim fee.

7 Monitoring the Duration

There is some evidence that duration has increased during the 1990s. It also seems likely that managed care will play some part in decreasing duration. Because it is generally true that the longer a claim remains open, the higher will be the expense of handling that claim, it is a good idea for claim departments to monitor progress or slippage in duration.

A process for monitoring the duration would be to use outstanding claims by report quarter and to monitor the percentage open at three, six, nine, and 12 months. In the absence of change in claims handling, one would expect to see the same percentages throughout a column.

By using report quarter instead of accident quarter, there is no issue with claim development. Also, by using report quarter rather than report year, the analyst can more quickly discern changes in outstanding rates (because of the frequency with which these reports will be produced) or any seasonality that may exist.

While this type of triangulation may be used to monitor duration, it also may be used by claim departments or third party administrators in setting goals for the future. The goal could be to continue to close claims at the same rate or the goal could be to close claims more quickly. The longer claims stay open, the higher is the total cost of handling claims although this could be a trade-off as closing claims too quickly could lead to more reopened claims and/or higher settlement values.

A claim department or third party administrator who is interested in more sophisticated monitoring techniques could use the same types of report quarter comparisons at successive evaluations to monitor:

- Average incurred claim size;
- Average paid claim size:
- Average outstanding claim size:
- Ratio of paid ALAE to paid loss;
- Average ALAE per reported claim;
- Average recovery per claim;
- Recovery as a percentage of loss; and
- Ratio of closed claims to the number of claims handlers.

By monitoring the claim closing rate as well as the claim costs and other measures at like points in time, a claim department can monitor not just the closing of the claims but the full range of statistics bearing on a claim department's performance.

8 Closing Comments

By using the techniques described here, a claim department or third party administrator can price claim service based on the total cost of handling the claim. This will allow the company to set up and maintain an adequate reserve and to monitor the success in handling the claims.

As claim prices have become unbundled in insurance and service proposals, insurance companies and TPAs have become more aware of the expenses involved in handling claims. The concepts presented in this paper provide a framework for pricing and reserving for claims, as well as for monitoring the efficiency of the claim handling process.